



**Massachusetts Department of Environmental Protection**  
**Source Water Assessment and Protection (SWAP) Report**  
**For**  
**Kripalu Center for Yoga & Health**

**What is SWAP?**

The Source Water Assessment and Protection (SWAP) program, established under the federal Safe Drinking Water Act, requires every state to:

- ? Inventory land uses within the recharge areas of all public water supply sources;
- ? Assess the susceptibility of drinking water sources to contamination from these land uses; and
- ? Publicize the results to provide support for improved protection.

**SWAP and  
Water Quality**

Susceptibility of a drinking water source does *not* imply poor water quality. Actual water quality is best reflected by the results of regular water tests.

Water suppliers protect drinking water by monitoring for more than 100 chemicals, treating water supplies, and using source protection measures to ensure that safe water is delivered to the tap.

Prepared by the  
Massachusetts Department of  
Environmental Protection,  
Bureau of Resource Protection,  
Drinking Water Program

Date Prepared:  
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**Table 1: Public Water System (PWS) Information**

<b>PWS Name</b>	Kripalu Center for Yoga & Health
<b>PWS Address</b>	West Street
<b>City/Town</b>	Stockbridge, Massachusetts
<b>PWS ID Number</b>	1283014
<b>Local Contact</b>	Mr. John Schneyer
<b>Phone Number</b>	(413) 232-7741

<b>Well Name</b>	<b>Source ID#</b>	<b>Zone I (in feet)</b>	<b>IWPA (in feet)</b>	<b>Source Susceptibility</b>
Well #1	1283014-01G	283	769	High
Well #2	1283014-02G	283	769	High
Well #3	1283014-03G	100	422	Moderate
Well #4	1283014-04G	100	422	Moderate

**Introduction**

We are all concerned about the quality of the water we drink. Drinking water wells may be threatened by many potential sources of contamination, including septic systems, road salting, and improper disposal of hazardous materials. Citizens and local officials can work together to better protect these drinking water sources.

**Purpose of this report:**

This report is a planning tool to support local and state efforts to improve water supply protection. By identifying land uses within water supply protection areas that may be potential sources of contamination, the assessment helps focus protection efforts on appropriate best management practices (BMPs) and drinking water source protection measures. Department of Environmental Protection (DEP) staff are available to provide information about funding and other resources that may be available to your community.

**This report includes:**

1. Description of the Water System
2. Discussion of Land Uses within Protection Areas
3. Recommendations for Protection
4. Attachments, including a Map of the Protection Areas

**1. Description of the Water System**

Kripalu is a yoga and holistic health center located in Stockbridge, on the Lenox town line, overlooking Stockbridge Bowl in south Berkshire County. Kripalu has a residential community and accommodates day and overnight visitors and students year round; the facility can accommodate up to 450 people. The facility previously

### What is a Protection Area?

A well's water supply protection area is the land around the well where protection activities should be focused. Each well has a Zone I protective radius and an Interim Wellhead Protection Area (IWPA).

- **The Zone I** is the area that should be owned or controlled by the water supplier and limited to water supply activities.
- **The IWPA** is the larger area that is likely to contribute water to the well.

In many instances the IWPA does not include the entire land area that could contribute water to the well. Therefore, the well may be susceptible to contamination from activities outside of the IWPA that are not identified in this report.

### What is Susceptibility?

Susceptibility is a measure of a well's potential to become contaminated due to land uses and activities within the Zone I and Interim Wellhead Protection Area (IWPA).

functioned as a Jesuit Monastery, Shadowbrook. Kripalu owns and maintains its own water supply system and wastewater disposal facility; to supplement their water supply, Kripalu purchases water from the Lenox Water Department. At one time, Kripalu had six wells. Wells #1 and #2 are currently the only active potable water supply wells. Wells #3 and #4 have been inactive since 1992 and Well #5 was abandoned and physically decommissioned to accommodate expansion and repair of a parking area. Well #6 was installed in 1988 but was never activated due to low productivity. The facility's wastewater is discharged to a wastewater treatment facility southwest of the main campus.

Well #1 is a 6-inch diameter, 162 feet deep bedrock well that is located immediately adjacent to the parking area behind the main building. Well #2 is a 6-inch diameter, 242-foot deep bedrock well that is located west of the maintenance building formerly the printing shop. In mid-November 2003, Kripalu was in the process of deepening Wells #1 and #2 due to a loss of capacity in those wells. At the time this report was prepared, the DEP did not have final completion depths of those wells. Wells #3 and #4 are located within 100 feet of each other, adjacent to the old greenhouses along Richmond Road. Well #3 is a 6-inch diameter, 382 feet deep bedrock well and Well #4 is a 6-inch diameter, 402 feet deep bedrock well.

The Zone I is the protected area immediately surrounding the well, while the Interim Wellhead Protection Area (IWPA) provides an interim protection area for a water supply well when the actual (Zone II) recharge area has not been delineated. The actual recharge area to the well may be significantly larger or smaller than the IWPA. The Zone I and Interim Wellhead Protection Area (IWPA) radii for this facility's wells are as follows: Well #1 – Zone I is 283 feet and IWPA is 769 feet; Well #2 – Zone I is 283 feet and IWPA is 769 feet; Well #3 – Zone I is 100 feet and IWPA is 422 feet Well #4 – Zone I is 100 feet and IWPA is 422 feet respectively. These protection area radii are based on the historic water withdrawal rates from these wells.

The Zone I area for Well #1 includes approximately half of the main facility, including parking, transformers and compactor/composter. The Zone I for Well #2 includes roadways, the maintenance/printing shop, vehicle storage and deicing materials (covered). The Zone Is for Wells #3 and #4 include a former very small, non-commercial greenhouse and a residence. The IWPAs for Well #1 and #2 include the rest of the main campus facilities except the wastewater treatment plant, which is topographically downgradient from the wells and outside of the protection areas.

**Table 2: Table of Activities within the Water Supply Protection Areas**

Potential Contaminant Sources	Zone I	IWPA	Threat	Comments
Maintenance garage/print shop	Well #2	Well #2	High	Herbicides: over-application or improper handling; fuel storage, transported chemicals, and maintenance chemicals: leaks or spills
Underground and Above Ground Storage Tanks	No	Well #1	High	Proper maintenance and upgrades to fuel tanks to prevent releases from occurring
Institution Uses	Well #1	Well #2	Moderate	Encourage residents and staff in proper storage, disposal, and application of pesticides
Transportation Corridors/Parking	Well #1	All	Moderate	Fuels and other hazardous materials: accidental leaks or spills; pesticides: over-application or improper handling

\* -For more information on Contaminants of Concern associated with individual facility types and land uses please see the SWAP Draft Land Use / Associated Contaminants Matrix on DEP's website - [www.state.ma.us/dep/brp/dws/](http://www.state.ma.us/dep/brp/dws/).

## Glossary

**Zone I:** The area closest to a well; a 100 to 400 foot radius proportional to the well's pumping rate. To determine your Zone I radius, refer to the attached map.

**IWPA:** A 400-foot to ½ mile radius around a public water supply well proportional to its pumping rate; the area DEP recommends for protection in the absence of a defined Zone I. To determine IWPA radius, refer to the attached map.

**Zone II:** The primary recharge area defined by a hydrogeologic study.

**Aquifer:** An underground water-bearing layer of permeable material that will yield water in a usable quantity to a well.

**Hydrogeologic Barrier:** An underground layer of impermeable material that resists penetration by water.

**Recharge Area:** The surface area that contributes water to a well.

The geologic mapping of the area indicates varying thickness of overburden material, primarily till with numerous exposures of bedrock in the upland areas. Data from the water supplier indicate casing lengths of over 100 feet in Wells #1 and #2, while Well #3 and #4 have approximately 25 feet of casing. Geologic mapping indicates a complex series of folds and faults. The primary bedrock is the Wollumsac Formation, a phyllite with limestone, with nearby contacts with the Everett Formation, chloritoid-rich schist and carbonates of the Stockbridge Formation.

Although wells #3 and #4 are free flowing artesian wells, there is no evidence of a continuous hydrogeologic barrier (clay layer) in the vicinity of the wells. Therefore, the aquifer is considered to have a high vulnerability to contamination. Nonetheless, the hydrogeologic barrier that does exist provides some protection relative to impeding the downward migration of contaminants from areas overlying the barrier. Please refer to the attached map of the Zone I and IWPA.

The wells serving the facility have no treatment at this time. The DEP requires public water suppliers to monitor the quality of the water. For current information on monitoring results and treatment, please contact the Public Water System contact person listed above in Table 1 for a copy of the most recent Consumer Confidence Report. Drinking water monitoring reporting data is also available on the web via EPA's Envirofacts website at [http://www.epa.gov/enviro/html/sdwis/sdwis\\_query.html](http://www.epa.gov/enviro/html/sdwis/sdwis_query.html).

## 2. Discussion of Land Uses in the Protection Areas

There are a number of land uses and activities within the drinking water supply protection areas that are potential sources of contamination.

### Key issues include:

1. **Non-conforming Zone I;**
2. **Residential Land Uses;**
3. **Institutional Uses;**
4. **Underground and Above Ground Storage Tanks and,**
5. **Transportation Corridor**

The overall ranking of susceptibility to contamination for the system is high, based on the presence of at least one high threat land use or activity in the protection areas of at least one of the wells, as seen in Table 2.

**1. Non-conforming Zone I** – Currently, none of the wells meet DEP's Zone I restrictions, which allow only water supply related activities or other non-threatening activities within the Zone I. The Zone I contains driveways, roads, parking spaces, institutional facilities, maintenance facilities and a residence. Systems not meeting DEP Zone I requirements must notify the DEP, receive approval and address Zone I issues prior to increasing water use or modifying systems.

### Recommendations:

- ✓ Although it is impossible to remove all activities within the Zone Is, Kripalu should continue to work toward prohibiting/limiting/impeding parking in close proximity to the well and using BMPs to protect the water supplies.
- ✓ Do not use or store pesticides, fertilizers or road salt within the Zone I.
- ✓ Continue to direct driveway and parking lot drainage in

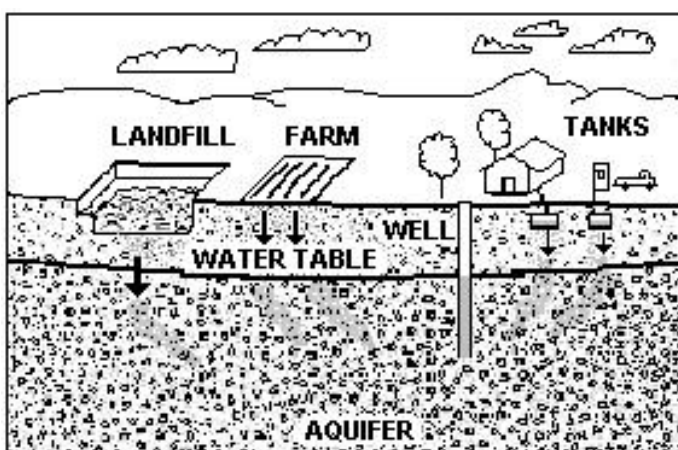


Figure 1: Example of how a well could become contaminated by different land uses and activities.

### For More Information:

Contact Catherine Skiba in DEP's Springfield Office at (413) 755-2119 for more information and for assistance in improving current protection measures.

More information relating to drinking water and source protection is available on the Drinking Water Program web site at:

[www.state.ma.us/dep/brp/dws/](http://www.state.ma.us/dep/brp/dws/)

### Additional Documents:

To help with source protection efforts, more information is available by request or online at [www.state.ma.us/dep/brp/dws/](http://www.state.ma.us/dep/brp/dws/) including:

1. Water Supply Protection Guidance Materials such as model regulations, Best Management Practice information, and general water supply protection information.
2. MA DEP SWAP Strategy
3. Land Use Pollution Potential Matrix
4. Draft Land/Associated Contaminants Matrix

Copies of this assessment have been made available to the public water supplier and town boards.

the Zone I away from the well.

- ✓ Continue investigating options for development of additional sources.

**2. Institutional use** – The facility is a residential and institutional facility with all associated activities including dormitories, an infirmary, recreational facilities, classrooms, dining commons, etc. In addition, there are all of the accompanying activities associated with maintenance and services provided to the facility including fuel oil storage, gasoline, transformers, maintenance facilities, roads and lawn maintenance.

- **Household Hazardous Materials** - Hazardous materials may include automotive wastes, paints, solvents, pesticides, fertilizers, and other substances. Improper use, storage, and disposal of chemical products used in homes are potential sources of contamination.
- **Heating Oil/Kerosene Storage** - If managed improperly, Underground and Aboveground Storage Tanks (USTs and ASTs) and their associated fuel lines can be potential sources of contamination due to leaks or spills of the fuel oil/kerosene they store.
- **Stormwater** – Catch basins transport stormwater from roadways and adjacent properties to the ground. As flowing stormwater travels, it picks up debris and contaminants from streets and lawns. Common potential contaminants include lawn chemicals, pet waste, and contaminants from automotive leaks, maintenance, washing, or accidents.

### Recommendations:

- ✓ Continue the use and maintenance of BMPs for activities within close proximity to the wells.
- ✓ Continue monitoring and managing stormwater runoff, directing it away from the wellhead.
- ✓ Do not use pesticides or fertilizers within the Zone I of the wells. Consider the use of Integrated Pest Management on campus to minimize the use of pesticides and nutrients in fertilizers.
- ✓ Educate residents on best management practices (BMPs) for protecting water supplies. Distribute the fact sheet “Residents Protect Drinking Water” available in Appendix A and on [www.mass.gov/dep/brp/dws/protect.htm](http://www.mass.gov/dep/brp/dws/protect.htm), which provides BMPs for common residential issues.
- ✓ Promote BMPs for stormwater management and pollution controls.

**3. Underground Storage Tanks (UST)** – There are four USTs located on the campus within the IWPA of the Well #1. All but one of the tanks contain fuel oil; one tank (a double walled tank with interstitial monitoring) is for gasoline storage. The tanks are approximately 17 years old, are double walled and have over-fill containment.

### Recommendations:

- ✓ USTs in close proximity to the water supply should be closely monitored, especially during deliveries. Review stormwater flow direction and anticipate control of a potential spill during delivery. Replace and upgrade tanks as appropriate.
- ✓ Continue to evaluate and consider a replacement well location and use of alternative fuel, as is feasible.
- ✓ Any upgrades and modification to fuel storage facilities must meet current construction standards and be done consistent with Massachusetts’ plumbing, building, and fire code requirements. Consult with the local fire department for any additional local code requirements regarding USTs.
- ✓ Require that fuel lines are sleeved to protect from leaks.
- ✓ Review construction details for the tanks to ensure that they include overfill protection. Retrofit those without containment, as is feasible.
- ✓ Ensure that a spill response plan is included in the school emergency response plans and ensure spill containment equipment is available. Include plans of storm drain systems in the emergency response plan.

V Monitor deliveries so that any spills can be readily contained.

**4. Transportation corridors and parking** – Even minor roads and internal facility roads are potential sources of contamination due to salting of roadways and leaks or spills of fuels and other hazardous materials during accidents.

**Recommendation:**

- ✓ Contact the local fire department to ensure that the IWPA is included in Emergency Response Planning.

Implementing the following recommendations will reduce the system's susceptibility to contamination.

### 3. Protection Recommendations

Implementing protection measures and best management practices (BMPs) will reduce the wells' susceptibility to contamination. Kripalu is commended for past efforts to protect water supplies through management of hazardous materials and controlling stormwater runoff. The facility should continue efforts in water supply protection through reviewing and adopting the key recommendations above and the following:

**Zone I:**

- ✓ Keep any new non-water supply activities out of the Zone I.
- ✓ Restrict use of salt within Zone I and drain stormwater away from well.
- ✓ Consider well relocation if Zone I threats cannot be mitigated.
- ✓ Conduct regular inspections of the Zone I.
- ✓ Do not use or store pesticides, fertilizers or road salt within the Zone I.

**Training and Facilities Management:**

- ✓ Continue proper hazardous material use, disposal, emergency response, and best management practices; include custodial staff, groundskeepers, and certified operator. Post labels as appropriate on raw materials and hazardous waste.
- ✓ Implement Best Management Practices (BMPs) for the use of fertilizer, herbicides and pesticides on facility properties.
- ✓ For utility transformers that may contain PCBs, contact the utility to determine if PCBs have been replaced. If PCBs are present, urge their immediate replacement. Keep the area near the transformer free of tree limbs that could endanger the transformer in a storm.
- ✓ As is feasible, replace the supply wells or remove threats such as the USTs.

**Planning:**

- ✓ Work with local officials in town to include the facility's IWPA in Aquifer Protection District Bylaws if the town establishes such bylaws in the future.
- ✓ Have a plan to address short-term water shortages and long-term water demands. Keep the phone number of a bottled water company readily available.
- ✓ Work with your community to ensure that stormwater runoff is directed away from the wells and is treated according to DEP guidance.

**Funding:**

The Department's Wellhead Protection Grant Program provides funds to assist public water suppliers in addressing Wellhead protection through local projects. Protection recommendations discussed in this document may be eligible for funding under the "Wellhead Protection Grant Program". For additional information, please refer to the attached program fact sheet. Each program year, if funds are available, the Department posts a new Request for Response for the Grant program (RFR). Other funding opportunities are described in "Grant and Loan Programs: Opportunities for Watershed Protection, Planning and Implementation" at <http://www.state.ma.us/dep/brp/mf/files/glprgm.pdf>.

These recommendations are only part of your ongoing local drinking water source protection. Citizens and community officials should use this SWAP report to encourage discussion of local drinking water protection measures.

### 4. Attachments

- Map of the Public Water Supply (PWS) Protection Areas
- Recommended Source Protection Measures Fact Sheet